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1 Efficient, Unified, and Scalable Performance Monitoring for Multiprocessor Operating Systems

Robert W. Wisniewski, Bryan Rosenburg

November 2003 **Proceedings of the 2003 ACM/IEEE conference on Supercomputing**

Publisher: IEEE Computer Society

Full text available: pdf(250.19 KB) Additional Information: full citation, abstract

Programming, understanding, and tuning the performance of large multiprocessor systems is challenging. Experts have difficulty achieving good utilization for applications on large machines. The task of implementing a scalable system such as an operating system or database on large machines is even more challenging. And the importance of achieving good performance on multiprocessor machines is increasing as the number of cores per chip increases and as the size of multiprocessors increases. Cruci ...

2 Quartz: a tool for tuning parallel program performance

Thomas E. Anderson, Edward D. Lazowska

April 1990 **ACM SIGMETRICS Performance Evaluation Review , Proceedings of the 1990 ACM SIGMETRICS conference on Measurement and modeling of computer systems SIGMETRICS '90**, Volume 18 Issue 1

Publisher: ACM Press

Full text available: pdf(1.51 MB) Additional Information: full citation, abstract, references, citings, index terms

Initial implementations of parallel programs typically yield disappointing performance. Tuning to improve performance is thus a significant part of the parallel programming process. The effort required to tune a parallel program, and the level of performance that eventually is achieved, both depend heavily on the quality of the instrumentation that is available to the programmer. This paper describes Quartz, a new tool for tuning parallel program performance on shared memory mult ...

3 FAST: A large scale expert system for application and system software performance tuning

A. E. Irgon, A. H. Dragoni, T. O. Huleatt

May 1988 **ACM SIGMETRICS Performance Evaluation Review , Proceedings of the 1988 ACM SIGMETRICS conference on Measurement and modeling of computer systems SIGMETRICS '88**, Volume 16 Issue 1

Publisher: ACM Press

Full text available: pdf(499.17 KB) Additional Information: full citation, references, citings, index terms

4 A methodology for tuning and verifying package simulation models
David C. Efron
August 1975 **Proceedings of the 3rd symposium on Simulation of computer systems**
Publisher: IEEE Press
Full text available: pdf(790.87 KB) Additional Information: full citation, abstract, references, citings, index terms

The computer system simulation packages are generally regarded as being capable of producing viable performance projections quickly and cheaply relative to the time and cost of programming unique simulation models. Many users also recognize that simulation models cast in the prescribed molds of the packages may be subject to various errors. They will therefore consider all results as coarse indications of expected performance levels. In contrast, this paper demonstrates how the p ...

5 Tuning: tools and techniques
J. P. Buzen
September 1976 **ACM SIGMETRICS Performance Evaluation Review**, Volume 5 Issue 4
Publisher: ACM Press
Full text available: pdf(635.86 KB) Additional Information: full citation, abstract

Tuning is basically a two stage process: the first stage consists of detecting performance problems within a system, and the second stage consists of changing the system to correct these problems. Measurement tools such as hardware monitors, software monitors and accounting packages are typically used in the first stage, and tools such as optimizers, simulators and balancers are sometimes used in the second stage.

6 Active harmony: towards automated performance tuning
Cristian Ţăpuş, I-Hsin Chung, Jeffrey K. Hollingsworth
November 2002 **Proceedings of the 2002 ACM/IEEE conference on Supercomputing**
Publisher: IEEE Computer Society Press
Full text available: pdf(659.48 KB) Additional Information: full citation, abstract, references, index terms

In this paper, we present the Active Harmony automated runtime tuning system. We describe the interface used by programs to make applications tunable. We present the Library Specification Layer which helps program library developers expose multiple variations of the same API using different algorithms. The Library Specification Language helps to select the most appropriate program library to tune the overall performance. We also present the optimization algorithm used to adjust parameters in the ...

7 The paragon performance monitoring environment
B. Ries, R. Anderson, W. Auld, D. Breazeal, K. Callaghan, E. Richards, W. Smith
December 1993 **Proceedings of the 1993 ACM/IEEE conference on Supercomputing**
Publisher: ACM Press
Full text available: pdf(1.13 MB) Additional Information: full citation, references, citings, index terms

8 Performance measurements for multithreaded programs
Minwen Ji, Edward W. Felten, Kai Li
June 1998 **ACM SIGMETRICS Performance Evaluation Review , Proceedings of the 1998 ACM SIGMETRICS joint international conference on Measurement and modeling of computer systems SIGMETRICS '98/PERFORMANCE '98,** Volume 26 Issue 1
Publisher: ACM Press

Full text available: pdf(1.37 MB) Additional Information: full citation, abstract, references, citings, index terms

Multithreaded programming is an effective way to exploit concurrency, but it is difficult to debug and tune a highly threaded program. This paper describes a performance tool called Tmon for monitoring, analyzing and tuning the performance of multithreaded programs. The performance tool has two novel features: it uses "thread waiting time" as a measure and constructs thread waiting graphs to show thread dependencies and thus performance bottlenecks, and it identifies "semi-busy-waiting" points w ...

9 Architectural support for performance tuning: a case study on the SPARCcenter 2000
A. Singhal, A. J. Goldberg
April 1994 **ACM SIGARCH Computer Architecture News , Proceedings of the 21ST annual international symposium on Computer architecture ISCA '94**, Volume 22 Issue 2
Publisher: IEEE Computer Society Press, ACM Press

Full text available: pdf(1.37 MB) Additional Information: full citation, abstract, references, citings, index terms

Latency hiding techniques such as multilevel cache hierarchies yield high performance when applications map well onto hierarchy implementations, but performance can suffer drastically when they do not. Identifying and reducing mismatches between an application and the memory hierarchy is difficult without insight into the actual behavior of the hardware implementation. We advocate the use of hardware event counters, as a cheap, effective and practical way to tune applications for a given hardwar ...

10 Monitoring program behaviour on SUPRENUM
Markus Siegle, Richard Hofmann
April 1992 **ACM SIGARCH Computer Architecture News , Proceedings of the 19th annual international symposium on Computer architecture ISCA '92**, Volume 20 Issue 2
Publisher: ACM Press

Full text available: pdf(1.02 MB) Additional Information: full citation, abstract, references, citings, index terms

It is often very difficult for programmers of parallel computers to understand how their parallel programs behave at execution time, because there is not enough insight into the interactions between concurrent activities in the parallel machine. Programmers do not only wish to obtain statistical information that can be supplied by profiling, for example. They need to have detailed knowledge about the functional behaviour of their programs. Considering performance aspects, they need timing i ...

11 ChaosMON—application-specific monitoring and display of performance information for parallel and distributed systems
Carol Kilpatrick, Karsten Schwan
December 1991 **ACM SIGPLAN Notices , Proceedings of the 1991 ACM/ONR workshop on Parallel and distributed debugging PADD '91**, Volume 26 Issue 12
Publisher: ACM Press
Full text available: pdf(1.08 MB) Additional Information: full citation, references, citings, index terms

12 Normalized performance indices for message passing parallel programs
Sekhar R. Sarukkai, Jerry Yan, Jacob K. Gotwals
July 1994 **Proceedings of the 8th international conference on Supercomputing**
Publisher: ACM Press

Full text available: pdf(1.16 MB) Additional Information: full citation, abstract, references, citings, index terms

Existing tools for locating performance bottlenecks of message passing parallel programs either provide visualizations or profiles of program executions only; they do not highlight the cause of poor program performance. From the perspective of the application, the location and cause of performance problems in terms of procedures, processors and data structures are all important. Identifying the cause of poor performance necessitates the need to expose how well the underlyin ...

13 Adaptive QoS parameters approach to modeling Internet performance
Shin-Jer Yang, Hung-Cheng Chou
January 2003 **International Journal of Network Management**, Volume 13 Issue 1
Publisher: John Wiley & Sons, Inc.
Full text available: pdf(139.90 KB) Additional Information: full citation, abstract, references, index terms

Due to the recent advances in Internet technologies and applications, the issue of Quality of Service (QoS) is more essential to Internet performance. In this paper, we address and discuss the influence factors and also finalize the QoS parameters for Internet performance. Then we present the simulation procedure for monitoring the performance evaluation and propose the algorithm for tuning the performance value. Based on simulation results and performance analysis, we can tune and adjust possib ...

14 A relational approach to monitoring complex systems
Richard Snodgrass
May 1988 **ACM Transactions on Computer Systems (TOCS)**, Volume 6 Issue 2
Publisher: ACM Press
Full text available: pdf(3.42 MB) Additional Information: full citation, abstract, references, citings, index terms, review

Monitoring is an essential part of many program development tools, and plays a central role in debugging, optimization, status reporting, and reconfiguration. Traditional monitoring techniques are inadequate when monitoring complex systems such as multiprocessors or distributed systems. A new approach is described in which a historical database forms the conceptual basis for the information processed by the monitor. This approach permits advances in specifying the low-level data collection, ...

15 Improving interactive performance using TIPME
Yasuhiro Endo, Margo Seltzer
June 2000 **ACM SIGMETRICS Performance Evaluation Review , Proceedings of the 2000 ACM SIGMETRICS international conference on Measurement and modeling of computer systems SIGMETRICS '00**, Volume 28 Issue 1
Publisher: ACM Press
Full text available: pdf(1.05 MB) Additional Information: full citation, abstract, references, citings, index terms

On the vast majority of today's computers, the dominant form of computation is GUI-based user interaction. In such an environment, the user's perception is the final arbiter of performance. Human-factors research shows that a user's perception of performance is affected by unexpectedly long delays. However, most performance-tuning techniques currently rely on throughput-sensitive benchmarks. While these techniques improve the average performance of the system, they do littl ...

Keywords: interactive performance, monitoring

16 Adaptive self-tuning memory in DB2
Adam J. Storm, Christian Garcia-Arellano, Sam S. Lightstone, Yixin Diao, M. Surendra

September 2006 **Proceedings of the 32nd international conference on Very large data bases VLDB '06**
Publisher: VLDB Endowment
Full text available: pdf(792.72 KB) Additional Information: full citation, abstract, references, index terms

DB2 for Linux, UNIX, and Windows Version 9.1 introduces the Self-Tuning Memory Manager (STMM), which provides adaptive self tuning of both database memory heaps and cumulative database memory allocation. This technology provides state-of-the-art memory tuning combining control theory, runtime simulation modeling, cost-benefit analysis, and operating system resource analysis. In particular, the nove use of cost-benefit analysis and control theory techniques makes STMM a breakthrough technology in ...

17 A scalable cross-platform infrastructure for application performance tuning using hardware counters
S. Browne, J. Dongarra, N. Garner, K. London, P. Mucci
November 2000 **Proceedings of the 2000 ACM/IEEE conference on Supercomputing (CDROM)**
Publisher: IEEE Computer Society
Full text available: pdf(2.82 MB) Publisher Site Additional Information: full citation, abstract, references, citings, index terms

The purpose of the PAPI project is to specify a standard API for accessing hardware performance counters available on most modern microprocessors. These counters exist as a small set of registers that count "events", which are occurrences of specific signals and states related to the processor's function. Monitoring these events facilitates correlation between the structure of source/object code and the efficiency of the mapping of that code to the underlying architecture. This ...

18 Stardust: tracking activity in a distributed storage system
Eno Thereska, Brandon Salmon, John Strunk, Matthew Wachs, Michael Abd-El-Malek, Julio Lopez, Gregory R. Ganger
June 2006 **ACM SIGMETRICS Performance Evaluation Review , Proceedings of the joint international conference on Measurement and modeling of computer systems SIGMETRICS '06/Performance '06**, Volume 34 Issue 1
Publisher: ACM Press
Full text available: pdf(895.31 KB) Additional Information: full citation, abstract, references, index terms

Performance monitoring in most distributed systems provides minimal guidance for tuning, problem diagnosis, and decision making. Stardust is a monitoring infrastructure that replaces traditional performance counters with end-to-end traces of requests and allows for efficient querying of performance metrics. Such traces better inform key administrative performance challenges by enabling, for example, extraction of per-workload, per-resource demand information and per-workload latency graphs. This ...

Keywords: Ursa Minor, end-to-end tracing, request causal chain

19 IMPuLSE: integrated monitoring and profiling for large-scale environments
Patrick G. Bridges, Arthur B. Maccabe
October 2004 **Proceedings of the 7th workshop on Workshop on languages, compilers, and run-time support for scalable systems LCR '04**
Publisher: ACM Press
Full text available: pdf(99.07 KB) Additional Information: full citation, abstract, references

A lack of efficient system software is an increasing impediment to deploying large-scale parallel and distributed systems. Systemically addressing operating system-induced performance anomalies requires accurate, low-overhead, whole-system monitoring, something that is currently unavailable in large tightly-coupled systems. In this paper, we present the design of IMPuLSE---Integrated Monitoring and Profiling for Large-Scale Environments---a system we are developing to meet this need. IMPuLSE's i ...

20 Session 3: Scalability and resource usage of an OLAP benchmark on clusters of PCs

Michela Taufer, Thomas Stricker, Roger Weber

August 2002 **Proceedings of the fourteenth annual ACM symposium on Parallel algorithms and architectures**

Publisher: ACM Press

Full text available: pdf(219.90 KB) Additional Information: full citation, abstract, references, index terms

Designing clusters of PCs for distributed databases processing OLAP(On Line Analytical Processing) workloads in parallel with good scalability remains a particular challenge as we are lacking a deep understanding of the architectural issues around resource usage by standard DBMSs on distributed platforms.To address this problem, we present a novel performance monitoring framework for filtering and abstracting samples of performance data from low level counters into a high level performance pictu ...

Keywords: cluster of PCs, distributed OLAP processing, parallel databases, performance analysis, workload characterization

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